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P A P E R S

I N

A G R I C U L T U R E.

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## A G R I C U L T U R E.

**T**HOMAS WHITE, of Retford, in Nottinghamshire, Esq. having formed a large plantation of Forest-trees on his Estate at Buttsfield, in the parish of Lanchester, and bishoprick of Durham, of which a short account is given in the second Volume of the Society's Transactions, page 11, (and also an account of Medals adjudged to Mr. White, for various trees planted on the same estate, in the years 1778 and 1779; see the same Vol. page 4, and 5) did this year become a candidate for the premium offered for planting the greatest number of ENGLISH ELM: and it appearing, by proper Certificates, dated May 13th, 1784, and

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signed by the Reverend Robert Dent, Minister of Lanchester, and John West, bailiff to Mr. White, that there had been planted at that place, between the third of February, and the eighth of April, 1784, ten thousand English Elm, from one to five feet high, at the distance of six feet and upwards, in order to raise Timber, which are all fenced with a good stone wall; and the Trees breaking into leaf in great vigour; the Gold Medal was adjudged to Mr. White, for the fame.

With the Certificates above mentioned was also received the following letter, by which it appears how much attention is paid to these plantations, and how much they are annually increasing.

*Workington,*

# AGRICULTURE. 5

*Workington, June 4th, 1784.*

Honoured Sir,

According to your desire,  
I have sent you an account of the Trees  
this year planted by me upon your estate  
at Butsfield plantations, as they were num-  
bered before their being planted, viz.

Alders	37230
Ash Mountain	4000
Beech	1150
Birch	62692
Elms	10000
Firs, Scotch	35135
Larch	240523
Weymouth Pines	6100
Sycamores	3397
	<hr/>
Total	400227
	<hr/>

Signed JOHN WEST.

TO THOMAS WHITE, Esq.

## 6 AGRICULTURE.

*The following Letter was received by the Society, in claim of the premium offered "to ascertain whether it is most advantageous to cultivate Wheat by sowing it in the common broad-cast way, by drilling it in equidistant rows, or by dibbling it;" but the Claimant not appearing to have made any comparative experiments, between the sowing Wheat in broad-cast, and drilling or dibbling it, which was an essential condition required, his claim could not be admitted: but the Thanks of the Society were given to the Reverend Mr. CLOSE, of Trimley, near Ipswich, the candidate, for the communication of those experiments made by him on a subject of so much importance to every one concerned in agricultural pursuits.*

S I R,

THE following are the particulars of an experiment, tried upon six acres and a half of mixed Loamy Land, in a low

## A G R I C U L T U R E.      7

low situation, and surrounded by Willow trees, which are greatly prejudicial to every crop. On the 16th, 17th, and 18th of October, 1783, set half the land with white Wheat, planting two feet two inches, and leaving the same space as intervals. August 29th, 1784, the Wheat was cut and stacked; thrashed this present January, and yielded thirty-two coomb of fine Corn, for which I have been offered one pound two shillings per coomb, but have not at present sold it. April 26, 1784, the intervals were set with the best Champion Potatoes: October the 2d, 4th, and 6th, they produced one hundred and forty-eight sacks of good Potatoes; one hundred sacks of which were sold at six shillings per sack, and forty-eight for seven shillings. The three acres and a quarter of Potatoes therefore produced forty-six pounds sixteen shillings; and the same quantity of land, occupied by the Wheat, must be

## 8 AGRICULTURE.

valued at thirty-five pounds four shillings; consequently the six acres and a half, returned one year eighty-two pounds. Add to this the advantage that will accrue from having the same Crops this year, only by reversing them; and I apprehend it must greatly exceed the Broadcast Husbandry, on the best cultivated lands. Many other advantages arise from this method. It employs more productive labourers, and many women and children, that cannot be serviceable in the common method of culture. The Wheat was set with a frame two feet two inches wide, having seven Tines\*. (*See the Figure on the opposite page.*) The Potatoes were dropped in a furrow made by a small deep-pitched double-breasted plough, about ten inches from set to set in the rows.

I

\* Mr. CLOSE has since experienced that a frame with FIVE Tines, is preferable to one of SEVEN, in the two feet two inches.

## AGRICULTURE. 9

I must beg you to communicate the above experiments to the Gentlemen of the Society for the Encouragement of Arts, Manufactures, and Commerce, by which you will oblige,

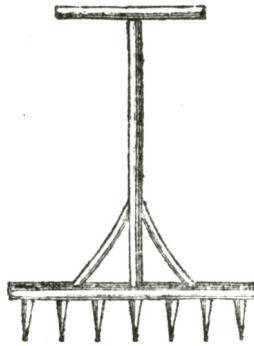
SIR,

Your obedient fervant,

*Trimley, near  
Ipswich, Jan. 30,  
1785.*

H. J. CLOSE,

Mr. MORE.



*The*

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*The Thanks of the Society were given to WILLIAM WHITMORE, of Dudmaston, near Bridgnorth, Shropshire, Esq. for the following Letter on the Drill Husbandry; and to OWEN SALUSBURY BRERETON, Esq. Vice President of the Society, to whom it is addressed, for the communication of it.*

TO OWEN SALUSBURY BRERETON, Esq.

*Dudmaston, Dec. 29, 1784.*

DEAR SIR,

AS the pleasure you took, while at Dudmaston, in observing the process and management of my little farm, especially in those experiments wherein I have deviated from the beaten track of common culture, led us often to discuss that most important consideration to agriculture, whether the Drill or Broad-cast Husbandry,

## AGRICULTURE. II

bandry, in all such soils where the Drill may with propriety be adopted, would in reality be the most advantageous cultivation, and in what degree it would deserve the preference; as far as my small experience may authorise me to form a judgment, I do not hesitate to decide greatly in favour of the Drill system, when properly understood; and I will venture to affirm, should ever that method be generally pursued, it will soon prove a great national advantage. Should you think the result of my few trials, this year, which I promised to send you, worthy the observation of your laudable Society, I shall be happy, at all times, to contribute my mite in the researches into agricultural improvements.

The soil on which I have begun to use the Drill Plough, is a good heavy loam, a spade's depth, having a sandy gravelly bottom. In the year 1783, it brought  
me

## 12 AGRICULTURE.

me a large crop of Turneps, after proper preparation of fallowing, mucking, &c. and they were eat off on the premises with sheep last spring, when it was twice ploughed; and in the middle of April, I planted on it, with Cook's Drill Machine, at eighteen inches drill, equally united throughout the field, six statute acres of Barley, and two of spring Wheat, taking something less than a bushel of seed to each acre. As soon as the grain was completely up, and weeds, especially Charlock, began to appear, (which always before was to me, and is, wherever land is subject to it, a great nuisance to the husbandman) I had the crop well hoed, two men working Cook's Hoe, walking between the rows, cutting up the weeds, and earthing up the mould to the roots of the grain, by the construction of its make doing, with ease, upwards of two acres a day; and it was, on a second appearance of weeds, repeated  
over

over again, which made the crop grow so vigorous, that you may remember the intervals between the drills were hardly discernible. Some few docks, that grew directly in the drill with the grain, were easily hand-weeded, and the whole field was as clean as a garden. The excessive heavy rains that fell last summer, injured many strong crops: this, though frequently lodged, rose again with great vigour. My neighbours, who had reprobated my method of proceeding, and ridiculed the folly of sowing so small a quantity of seed, found their prediction of a small Crop, prove the reverse; for my return was upwards of sixty bushels Winchester measure of Barley, and thirty bushels of spring Wheat, to the acre.

I shall therefore observe, as the most favourable and rich spots in these environs will not produce, by any broad-cast sowing, above fifty bushels of Barley, that  
this

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this system, exclusive of a large crop, has, in respect of saving of seed, evidently the advantage; not only as it regards general benefit, but even individually so, in point of œconomy, the two hoeings being well performed for three shillings an acre. In respect to Wheat, I find twenty-five bushels reckoned a fair crop, in the best districts. I have therefore greater reason to recommend it for winter tillage, it seldom being required to clover down a corn crop, which is the only objection I know that can militate against this method of management; and I must observe, that more than thirty bushels of winter-planted corn, may be expected by this process; as many crops, I am informed, by this method turned out forty and fifty bushels; but I must remark, that they were planted at one foot equally distant throughout.

Having,

Having, Sir, troubled you so far, permit me to make some few remarks, that may perhaps deserve investigation. It appears clear to me, in the first place, though my crop was great, I certainly need not regard it as equal to the greatest return that field could produce; for the fibres of Corn, or Barley roots, as far as we can trace, do not extend above six inches each way: in that case it is evident, that there would remain six inches breadth of earth between each row unpervaded with roots, and no ways exhausted of vegetable pabulum; for which reason, I will venture a surmise that even a crop one third larger, might be attainable on the same ground. However, let us drop conjectures, and content ourselves with experiments and facts, the proper instructors for general improvement in rural œconomicks. But to return, Had the Barley been nearer, it would not have continued tillering so late; for  
some

## 16 AGRICULTURE.

some few of the outward later shoots had not obtained their full maturity when the crop in general was quite ripe, which makes me judge it right in future to sow nearer, but on no account so as to exclude the operation of the hoe; for on it I place my chief dependance, both as to the immediate, as well as to the succeeding crop, being in fact a kind of summer fallow, having equally the two advantages, of killing weeds, and changing the surface that is alternately exposed to the atmosphere, to imbibe its vegetative properties. Immediate ploughing after harvest, destroys every autumn weed; and also the turning, under a stiff stubble, will of course keep the land so light and porous as to make it imbibe deeply the full effect of winter frost. I ought not to omit mentioning that this said field was, on the whole fourteen acres, all alike in Turneps; and that the six unoccupied by the Barley or Wheat, were  
planted

planted at the same time in two distinct  
 placks with Peas and mazagan Beans :  
 the result was, that the Beans being sown  
 so late, made but a poor return, although  
 the hoeing gave such a vigour to their  
 growth, that many stalks were eight feet  
 high ; and the Peas being scattered too  
 thin, notwithstanding careful hoeing, were  
 so foul in the drill, that I had but eight  
 bushels to the acre ; a convincing proof  
 that pursuing the best system, will not  
 insure success, if improperly managed,  
 which is but too often the fate of many  
 ingenious inventions, and thereby they sink  
 into oblivion.

Having thus, Sir, imparted to you the  
 few farming ideas my little experience  
 has enabled me to presume conclusive, I  
 shall finish by informing you, that I shall  
 venture the whole of my autumn and spring  
 sowing, on the plan I have here adopted ;

B of

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of which I will with pleasure transmit you  
a minute detail, should such proceeding be  
regarded as worth inspection, and lead others  
to avoid errors, or profit by inspection. I  
remain,

DEAR SIR,

With great respect and sincerity,

Your affectionate nephew,

WILLIAM WHITMORE.

*The*

*The Gold Medal was adjudged to Mr. THOMAS ROBINS, of Bowldon Farm, in the Parish of Lashborough, near Tetbury, Gloucestershire, for the greatest Quantity, per Acre, of Turnep-rooted Cabbage; from whom the following Account was received, together with a proper Certificate, signed by the Reverend JOHN GREGORY, Minister of Lashborough.*

SIR,

SEEING in your last publication a premium offered for the greatest weight of Turnep-rooted Cabbage, per acre, and having grown a fine piece myself, I was induced to weigh it, which weight is inclosed in the Certificate, and must beg to become a claimant; and though it might, in comparison with the weight of Turneps raised per acre, appear but trifling, yet its value, at the time it is made use of, is almost incredible. Last spring,

B 2

fodder

## 20 AGRICULTURE.

fodder being scarce, and the Turneps all eat, I tried the experiment how many sheep might be kept upon one acre, for a given time ; I shut up two hundred ewes, with their lambs, into a piece of pasture land, poor in its nature, and in extent small, being not more than ten acres, and fed them regularly, after pulling up the roots and cleansing them from leaves, dirt, &c. and found that one ton, or twenty hundred weight, was sufficient to serve them one day, and to keep them in all desirable health. I then gave them one piece more of land to run over, that was planted, the preceeding year, with ryegrass ; and though the feed, from being eat all winter, and late the same spring, was very trifling, yet by the help of that I made thirteen tons serve them eighteen days, and the ewes and lambs at the end of that time were very much improved ; which was more than four acres of Turneps

## AGRICULTURE. 21

neps would have done in April, the time those were fed.

The soil, a stone braish, inclining to sand, not worth more than ten shillings per acre.

The preparation the same as for Turneps; that is, a winter and summer fallow, three times ploughed, about twenty put load of compost per acre, earth and dung properly mixed the preceding winter. As I have always found this kind of compost answer much better than dung alone, I take care to be provided with a sufficient quantity. About the beginning of April, the seed is sown in a clean spot of ground, generally upon an old pasture where the sheepfold has been in the winter after taking away the dung; taking care to have it dug very shallow, as the roots of the young plants might soon reach the dung or salts,

B 3

which

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which must consequently be left, in order to force them out of the flies way, as those insects are amazingly fond of them, more so, I believe, than of turneps.

About the middle of June, if the weather will permit, they should be planted out, upon one bout ridges, raised by a double plough, made for that purpose. Seven thousand plants are sufficient for one acre ; if only six, the roots will be the larger. As soon as the weeds rise, they must have a hand-hoeing ; after that, I plough a furrow from each ridge, which, after lying a proper time, is with the double plough thrown back, which is all necessary for their cultivation. Must beg leave to subscribe myself with much respect and esteem,

SIR,

Your obliged humble servant,

THOMAS ROBINS.

To Mr. MORE.

*The*

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*The following Certificate accompanied Mr.  
ROBINS'S Claim.*

THIS is to certify that Mr. THOMAS ROBINS, of Bowldon Farm, in the parish of Lashborough, near Tetbury, in the county of Gloucester, had five Acres of Turnep-rooted Cabbage this year: the average weight, per acre, after the leaves and dirt were taken off, was thirteen tons ten hundred and seventy-six pounds.

In witness whereof we have hereunto set our hands, this 25th day of October, 1784.

Signed

J. GREGORY, Curate of Lashborough.  
WM. TUGWELL, Overseer.  
RT. COMELY, Churchwarden.

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*The Thanks of the Society were given to Mr. ROSS, and to Mr. SMALL, for the following Communication, by which the Utility of the Turnep-rooted Cabbage is clearly demonstrated, particularly for feeding Sheep, even in the most northern part of the Island of Great Britain, where, from the Severity of the Winters, the Opportunity of obtaining Spring Food for Cattle and Sheep, is an Object of very great Importance.*

*Extract of a Letter from Mr. JOHN ROSS, Professor of Church History, in the College of Aberdeen, to Mr. ALEXANDER SMALL, a Member of this Society.*

DEAR SIR,

WE made a fair trial of the Turnep-rooted Cabbage, at Cullen House\*, last year: they succeeded beyond expectation,

\* Cullen House is the seat of the Earl of FINLATER, in Bamf Shire, near the northern extremity of Great Britain.

## AGRICULTURE, 25

tation, as you will see by the following note from the Overseer ; and there are as many seeds of them preserved this season as would sow a whole county. I intend to send a considerable quantity to Sir A. RAMSAY, and Mr. BARCLAY, of Ury, together with the two Volumes of the Transactions of the Society instituted at London for the Encouragement of Arts, Manufactures, and Commerce ; in which the directions for cultivating them are contained. I cannot entertain a doubt of their supplying the want of spring food after the Turneps are exhausted.

“ The seeds of the Turnep-rooted Cabbage were sown about the middle of March, 1784, in garden - ground properly prepared, and the plants were fit for transplanting by the middle of June, when they were transplanted into a dry light soil, well cleaned and dunged, with rotten cow - dung, in rows three feet distant

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tant from each other, and at the distance of twenty inches in the rows.

“ They were kept very clean, and the earth was hoed up to the roots of the plants, which perhaps prevented the bark of the roots from becoming so hard as otherwise it might have been ; after all, it was necessary to cut the roots in two, before the sheep could eat them : after they were cut, the sheep eat them greedily, preferring them to every other sort of food ; and the roots continued perfectly sound and good, for at least a month, after the common Turneps became unfit for use.

“ The roots in general weighed from eight to ten pounds ; a few of them more.”

*The*

## AGRICULTURE. 27

*The Thanks of the Society were given to Mr.*

*JOHN WAGSTAFFE, the Writer of the following Letter, for the useful Communication contained therein.*

ESTEEMED FRIEND,

AS I do not presume to become a claimant for the honourable distinction assignable by the seventy-ninth proposal of a premium, “ For a method of improving soils lying waste or uncultivated ;” having had my experience of such improvement, confined to a small compass ; but yet of sufficient extent, to enable me to form some judgment of the practicability of the improvement of any waste, when nature has spread a vegetable turf, and the conversion of such waste, under that natural advantage, to a succession of arable production ; I therefore address thee, without any concealed signature, with a short detail of such improvement ; my principal object being to point out an early beneficial inclosure, in a mode,

I

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I conceive, not before practised, and for a supplemental inquiry of thee to follow the close at this address, which will await thy reply.

Respecting the land, three acres of which were marsh land, generally under water in the winter, and frequently during the summer, and in which were several stagnated hollows of water, the constant receptacle of water, snails, and other water insects; the other part more generally covered with rushes, and other aquatic plants, that hardly the fourth of the whole extent afforded a pasturage for cattle. As it might be naturally suggested, I opened drains for the water, and intersected, by open ditches, my three acres, into as many distinct pieces. The excavations of the ditches raised some of the lesser inequalities, while earth, brought from a neighbouring hill, raised the hollows. The plough was now capable

pable of traversing from ditch to ditch ; and the first year afforded a good crop of Oats, and another of Turneps, (the same season) ; the next year, Barley ; and the two subsequent summers, a two-fold crop of Trefoil and Clover. This last year, 1784, I had near half of it dibbled for Wheat, which was allowed to be equal to any in the neighbourhood, and was productive beyond the common average.

The heath land (one acre ) was the gratuitous gift of the lord of the manor (Sir Wm. Jerningham). In the spring of 1782, which, after cleaning of furze and ling, I spread about two load of stable dung over its surface, broke up the turf, as is accustomed in this country, for the planting of Wheat ; on which I had Peas dibbled, which produced well. The year 1783 gave me a bounteous crop of Wheat ; and even 1784, the same Grain, having previously spread fe-  
veral

veral load of a loamy clay, obtained beneath its surface, over it ; with a farther refreshment of stable manure. This crop was little inferior to the former ; and the present year, without any additional dressing or manure, the best crop of Barley of the vicinity. I wish to apologize for this length of communication, my primary object being the mode of inclosure.

After the ground was marked, I opened at due distance, within about two feet (where was to be) of the interior edge of the ditch, holes about eight inches deep, where I planted large cuttings of the black and white Poplars, particularly the former ; and upon the opening of the ditch, the turfs pared from the surface were piled about fifteen inches in height round the fixed cuttings, intermixed with a small portion of better earth than the native soil. The bank now raised in the Norfolk mode of inclosing, presented the  
cut-

cuttings in the middle, three and four feet in height above its surface, which are now from nine to twelve feet in height, with branches extended, I believe, equal in length and girth to their stems when first planted. I may add, that, in the intervals of these promising timbers, I planted truncheons of the fallow, and various other species of the Willow, which have diffused their branches, that, if now lopt, there might be formed from them numerous faggots. I may farther add, that this inclosure is on the acclivity of a hill, a situation not friendly to the growth of the poplar species. I am, with attentive regard to the Society,

Thy respectful friend,

*Norwich*, Dec. 11, 1785. J. WAGSTAFFE.  
To Mr. MORE.

P. S. I shall be glad to be informed whether the Society has received a satisfactory discovery to the 107th premium of a substitute for or preparation of Yeast. If not, I wish, at the Society's own future appointment, to communicate what I have found (as far as I have tried) an effectual substitute for that fermenting substance.

**I**N the Year 1782, the late KEANE FITZ GERALD, Esq. Vice President of this Society, communicated to the Royal Society, a paper printed in the 72d Vol. of the Philosophical Transactions, page 46. In that paper, Mr. FITZ GERALD gives an account of some Hemp-seeds, which he had received from the late Mr. ELIOTT, being sown by his direction, and growing to the height of more than fourteen feet, and nearly seven inches in circumference. The plants were pulled up in the beginning of November, and, being steeped a fortnight in water, were placed against a southern wall to dry. Mr. FITZ GERALD was afterwards agreeably surpris'd to find the Hemp could easily be stripped from the woody part, not only of the stem, but of the lateral branches also. The produce of Hemp, from thirty-two plants, was three pounds and a quarter. Mr.

FITZ

FITZ GERALD, applied to the Directors of the East-India Company, to procure some of the seed from China ; and in consequence of this request, some of those seeds, together with two other kinds under the name of Flax, were received by the Company, on board the ships that arrived in the latter end of the year 1784 ; and in order that proper experiments might be made therewith, the Directors, in April, 1785, obligingly favoured the Society with some of each sort. These were distributed to several members ; but as they were sown later in the season, than perhaps they ought to have been, few of them appear to have ripened their seeds.

One of the following letters contains an account from Mr. HOY, gardener to the Duke of Northumberland at Sion ; his Grace, whose attention to every kind of improvement is too well known to

C need

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need being expatiated on, having directed that some of each kind should be cultivated in his gardens.

The other letter is from Mr. LAURIE, a gentleman particularly curious in the culture of exotic Plants. But as another quantity of seed is now arrived from China, further experiments will be made therewith, and the result of the trials laid before the public in some future volume of these Transactions.

*Sion*

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*Sion House, Dec. 9, 1785.*

S I R,

**I**N a Letter received by Mr. BELL, you wished to be informed of the method I have taken to cultivate the different sorts of Hemp and Flax seed, received from you in April last. I tried them three different ways.

First, sowed some of each in a hotbed, where the heat was very strong, on April 14th: N<sup>o</sup> I. and IV. (which are certainly the same) appeared above ground on the 18th; but N<sup>o</sup> II. and III. not until the 22d. On the 25th, I potted them into second size pots, three plants in each, and set them under a hotbed frame, where the heat was gone off, to harden them for planting in the natural ground, which I did on the 30th, by turning them whole out of the pots; letting them, three together,

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be planted at two feet distance every way, covering them at times for about ten days, until they were rooted (or should have been). The Flax, N<sup>o</sup> III. or *corchorus olitorius* of Linn, died off in a few days; I replaced it several times, but without effect.

The second sort of Hemp, *crotolaria juncea* of Linn, got to the height of about three feet and a half, stem the size of a common wheat straw, and flowered, but did not bring seed. The Hemp, N<sup>o</sup> I and IV. got the height\* that you have received some; and would have been a deal stronger and taller, but were hurt much by the high wind. The male Hemp flowered very well, but the female did not; the frost came on them, so that they brought no seed.

Second

\* The Plants sent by Mr. Hox, were from twelve to fourteen feet in height, and many of them nearly seven inches in circumference at the bottom of the stems.

Second Trial. April 14th, sowed some of each under glass cover, without bottom heat, that they might be hardier. N<sup>o</sup> I. and IV. were up on the 30th, the others later, in the same proportion as before. This sowing, although much later, the Hemp got quite as strong as the former; the other sorts as above came to nothing. I potted out some of N<sup>o</sup> II. and III. and kept them in hotbed, and hothouse. Got the second to flower four feet high; the third, or *Flax*, two feet and half: they both damped off the beginning of November. I had one pot of Hemp in the stove, in which were one female, and two males; of them I saved a few seeds.

Third Trial. April 27th, sowed all the sorts, in patches, in the natural ground; some of all came up, but the Hemp only came forward. The soil being rich, this last got as strong as the first and second trials, they being on poorer soil. I am sorry

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I did not sow the common Hemp with the others to compare. I think the form of their leaves are nearly alike; the China Hemp is of a paler green. I shall try to preserve them though the winter, but I think by every appearance that they are all but annuals.

I shall be happy to give you any farther information that may be required; and am,

S I R,

Your most obedient

Humble servant,

THOMAS HOY.

Mr. MORE.

S I R

S I R,

AS you was kind enough, some time since, to favour me with some seeds, brought, as I understood, from the East Indies, I now take the liberty to transmit you an account of their produce ; in order to which, I have inclosed you the several specimens of each, with their numbers, &c. as delivered to me\*.

N<sup>o</sup> I. Hemp, supposed by me to differ in no respect from the fourth sort, (Hemp N<sup>o</sup> IV.) and very little, if at all, from our common manured Hemp.

N<sup>o</sup> II. Hemp §. I believe there must have been a mistake in the name given to this, as it does not agree with the general

C 4 characters

\* Those dried Specimens are reserved in the Society's Collection.

§ Thus these seeds were marked when sent to the Society from the East-India Company.

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characters ascribed to Hemp, which particularly mention digitated or fingered leaves. However, as the Plants have not as yet produced any flowers, or parts of fructification, I cannot refer them to their proper class.

N<sup>o</sup> III. Flax \*. This is a species I do not remember to have seen before : it has produced no flowers this season, and the leaves (as may be seen by the specimen) are now beginning to wither.

N<sup>o</sup> IV. Hemp. This, as I mentioned above, corresponds exactly with the first sort, both in its seeds and plants. It may be necessary to add, that the method I took to raise the Plants, was by sowing the seeds in pots filled with a loamy soil, in the spring, and plunging them into a bed made of Tanner's bark : some  
of

\* See Mr. Hov's Letter.

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of the Plants appeared in a few days, the rest soon after.

As these plants are herbaceous, and will probably produce flowers next summer, any remarks I may make (if I am not thought too troublesome already) will be faithfully transmitted you.

I am, SIR,

Your most obedient

Humble servant,

WILLIAM LAURIE.

Mr. MORE.

*Holloway*, Sept. 1,  
1785.

P. S. Any future favours of this kind will be gratefully acknowledged.

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*Bartholomew Clofe*, Dec. 17, 1785.

SIR,

**I**N consequence of an advertisement in this day's Advertiser, respecting the culture of the Chinese Hemp, I think it may not be improper, at this time, to inclose you (agreeable to my promise) some further observations upon that subject.

Two plants, the one of the Hemp (No. I.) the other of the Hemp (No. IV.) have since produced perfect seeds, which, as hinted in my former letter, exactly correspond; and thereby (as well as the appearance of the plants) leave no room to doubt their being of the same species.

The

## AGRICULTURE. 43

The stems of these plants are sent you herewith, for the inspection of the gentlemen of the Committee.

It may also be necessary to add, these were transplanted from the feed pots into the open ground.

The Plants of Hemp (N<sup>o</sup> II. and Flax, ( N<sup>o</sup> III. ) are now decayed to the roots, without producing either feeds or flowers.

I am, S I R,

Your obedient humble servant,

WILLIAM LAURIE.

*The*

## 44 AGRICULTURE.

*The Gold Medal, being the premium offered for gaining Land from the Sea, not less than twenty Acres, on the Coast of England or Wales, was adjudged to Mr. JOHN HARRIOT, of Rochford, from whom the following Letters were received, with proper Certificates signed by BACKHOUSE CARR, Esq. one of His Majesty's Justices of the Peace for the County of Essex, and many other respectable Gentlemen of that County.*

*Rochford, Sept. 15, 1785.*

S I R,

I N consequence of the premium offered by the Society for the Encouragement of Arts, Manufactures and Commerce, for gaining Land from the Sea, I take the liberty of laying before them an account of my inclosing one hundred and forty-  
two

## AGRICULTURE. 45

two acres of land, which was constantly overflowed by the sea flood-tides, about four feet deep on an average.

I hope I may not prove tiresome in the recital, but will endeavour to be as concise as my language will allow me, in order to be intelligible.

In May 1781, I purchased an island, called 'Rushley, situate between Great Wakering, in Essex, and Foulness Island, containing two hundred and sixteen acres of land, which was covered by the sea every flood-tide, but left dry on the ebb. About the middle of June, I began to inclose the same, by raising a bank of earth, thirty feet wide at bottom, seven feet high, and four feet wide at top, giving the advantage of the batter or slope, full two for one on the outside; that is, every foot in height, was drawn in two feet; by this means, the violence of the waves is so much abated that

## 46 AGRICULTURE.

that, instead of beating, shaking, and tearing the banks, which is the case with all that I have seen, they spend their fury in a gentle curl up the slope of the bank.

I had from twenty to thirty people constantly at work upon this bank, until the following Christmas; at which time I had completed my bank, containing six hundred and forty rod in length, twenty-one feet to the rod. The bank running in the circular form of the Island, the extreme ends were brought opposite each other. A large deep Rill, seventy-five feet wide, and twenty feet deep, through which the tide (now confined by the Bank) poured in and out with a fall like that at London Bridge. To get across this Rill, and shut the tide out, was to be the ultimatum of all my hopes and fears; and it may be supposed they were not a little agitated, as the greatest  
part

part of my little property was at stake, and the whole neighbourhood, who had deemed it impracticable, were kindly divided into two opinions only, viz. whether I was most madman or fool, for attempting it.

On Christmas-day, an attempt was made (with earth only) to close the Breach up, which proved ineffectual; for the next tide carried it all away. My spirits raised with my difficulties; I immediately determined on another plan, and procured long piles, or rather timber trees, and, when framed ready, drove them (by the help of an engine) into two rows across the Rill, leaving a space of fifteen feet between the rows, and six inches between the piles. I then laid a tier of strong girders across, about four feet from the bottom, and another about three feet from the top of piles; the height of the piles, when drove into the ground, being fourteen feet.

When

## 48 AGRICULTURE.

When this was completed, taking the advantage of the lowest of the neap tides, I filled this Camm, or Hutch, with earth in one tide; and which, when filled, became one strong compact Body, so that no one part could give way, without the whole.

I raised the earth just high enough to prevent the tide overflowing it; and before the next tide came, I had strengthened the Camm by stowing earth on each side, and raising the top. This I continued doing until I had extended the foot one hundred feet towards the sea, and fifty feet within side, raising the top gradually all the time, until I had attained the same height (or rather higher) as the bank, making it seven feet wide at top.

By this plan, on the 17th of January, following my Christmas miscarriage, I  
effec-

## AGRICULTURE. 49

effectually shut the tide out from one hundred and forty-two acres of rich arable land, and by the same means am enabled to graze the seventy-four acres of saltings withoutside the bank. The purchase of the Island was forty pounds ; including which, with my expences of embanking, &c. the whole amount of my gaining the said land from the sea, was only five hundred and seventy pounds : since that, it has cost me about fifty pounds more in raising particular parts of the bank that settled more than the rest.

I have likewise built a house, a barn, and stable, on the Island, where my looker and family, with two or three labourers, constantly reside.

The land, for the first two years, was so very poachy and wet, that it was with much difficulty I was able to stir any of it ; but by perseverance, I thank God, I

D

have

have now one hundred and twenty acres of it, in as good tillage as any Turnep land; seventy acres of which is now sown with Rape seed, for a crop next year: the other fifty I mean to sow next spring, some with Mustard seed, and some with Oats. I find the salts are too powerful in the land, as yet, for Wheat; but from what little Rape or Mustard seed I grew this last year, I find it suits either of them exceeding well; and with the blessing of God, I hope next year's crop will not only save me from the predictions of many of my neighbours, viz. my ruin, but begin to repay me with interest; for so confident am I of the richness and goodness of the soil, that (unless necessity should compel me to it) I would not let it for forty shillings per acre; and had I the command of a few of those spare thousands which many gentlemen seem at a loss what to do with, I make no doubt  
but,

AGRICULTURE. 51

but, in a few years, I could enlarge his Majesty's dominions, by an increase of rich landed property to individuals.

The accompanying Certificates, I hope, will prove satisfactory : if not, I must beg the favour, of your informing me what more is necessary ;

And am, SIR,

Your most obedient

And very humble servant,

JOHN HARRIOT.

To Mr. MORE.

*The Committee of Agriculture, having taken the foregoing Account into their consideration, directed a Letter to be written to Mr. HARRIOT, desiring him to inform the Committee, whence the Water of the Rill therein mentioned arises? what Provision is made for the discharging any superfluous Water from the Land? and how the Cattle are to be supplied with fresh Water? In answer to which Queries, the following Letter was received.*

SIR,

**I** THIS day received your much-esteemed favour of the twenty-second instant, advising that the Committee of Agriculture wished to be informed whence the water of the Rill, mentioned in my former account, arises? what provision is made for discharging any superfluous water from the land? and how the cattle  
are

are provided with fresh water? To the first, I have to observe, that, previous to my beginning to embank, the whole Island was intersected with several very irregular large Rills, which, as they communicated with each other, divided the land into so many irregular marshes or fields; yet they had but three inlets or outlets, through which the tide constantly ebbed and flowed, covering the whole surface of the Island long before high water; time, and the continual irritation of such ebbing and flowing, having made those Rills equal to the receiving and discharging the tide, so fast as it ebbed or flowed. But long before I could finish my Bank, I found it necessary to stop the two smaller inlets, which I easily effected whilst the tide ebbed and flowed so gently; but after this, when the tide had but one inlet, and the Bank nearly completed, it formed so large a reservoir, that the tide could neither come in nor

## 54      A G R I C U L T U R E .

go out fast enough to keep the water on a level, which of course caused a great fall both ebb and flood. When I first began my Bank or Wall, I did not propose stopping either of the inlets until the last of all; but I soon found myself obliged to stop two of them, in order to prevent the water having a thoroughfare, which began to damage the inside of my Bank. After they were stopped, the water within did no further damage to my Bank, its effect and violence being directed to one point: and when at the last I shut the tide entirely out, by filling up that only remaining large Rill or Inlet, as described in my former Letter, there remained no other cause for superfluous water, except the draining of the wet land, and what fell from the heavens; for which I had at the beginning prepared and laid a Drain or Gutter, made of Elm, eighteen inches wide, twelve inches deep, and fifty feet  
in

in length, with proper lids at each end to let the water in or out at pleasure : this Gutter lies three feet and a half lower than the surface of the earth. And here I beg leave to observe a great mistake that is formed in most Gutters that I have seen ; in general they are made square, or nearly so, yet there is no comparison in the discharge of water from a flat Gutter, of the same number of square inches with a square Gutter.

I wish it were in my power to give the Gentlemen of the Committee a better account of my success, in endeavouring to provide good fresh water for my Cattle. It is now two years since I made a Pond, twenty-five feet wide, forty feet long, and three feet deep from the surface: all the earth that came out I formed into a sloping Bank, round the Pond, to enlarge the surface for catching rain, &c. by which means (and the first winter when there was a great fall of snow, I set my men to casting of snow

## 56 AGRICULTURE.

into it) I have several times filled it, and as often have had to empty it; for although it is fresh at first, it soon gets brackish. The bottom is a blueish leaden-coloured firm loam, and holds water like a china bowl; yet I am of opinion, it is the oozing of the salts from the bottom, that continues to make the water so brackish, and unfit for use, that I am for the most part obliged to fetch my water in casks, except in rainy weather, when the troughs round my buildings supply me pretty well. However, I am in some hopes that the ensuing winter may wash away and exhaust the remaining salts, about the sides and bottom of the Pond: if not, and next year's crop proves as I have every reason from present appearances to expect it may, I intend being at the expence of first claying the bottom and sides, then lay flat square bricks in terras, and over that a layer of chalk, beat fine, which I should think may prove effectual.

Be

AGRICULTURE. 57

Be pleased, Sir, to present my best respects to the Gentlemen of the Committee, and acquaint them my heart exults in the thought that my labour may not be unworthy their notice; and next to their approbation, they cannot give me a more sensible pleasure, than pointing out (by their questions, &c.) how I may add my mite of information for public utility, either by personal attendance, or in such humble inditing as I am capable of. I am, with great respect,

S I R,

Your much obliged and  
very humble servant,

JOHN HARRIOT.

To Mr. MORE.

*Rochfort*, Nov. 25,  
1785.

*On*

58    AGRICULTURE.

*On Mr. HARRIOT's receiving information that the Society had adjudged their Gold Medal to him in consequence of the above Account, he addressed the following Letter to the Secretary.*

S I R,

**M**Y most sanguine expectations, when realised by successive crops, from my new inclosed land, will not afford me a more sensible nor lasting pleasure, than what I received this day from your favour of the 8th instant, informing me that the SOCIETY FOR THE ENCOURAGEMENT OF ARTS, MANUFACTURES, AND COMMERCE, have adjudged me their Gold Medal, for gaining one hundred and forty-two acres of land from the sea on Rushley Island.

Be pleased, Sir, to make my most respectful acknowledgements to the honourable Members for so distinguished a mark of their approbation :

AGRICULTURE. 59

approbation : it is a favour which I shall ever be proud of, and have only to lament my poverty in expression, in not enabling me to convey in suitable language, the pleasing sensations I have received on the occasion.

My sincere thanks are most justly due to yourself for so flattering an addition to my pleasure, in your very kind and polite manner of communicating the same, and for which I shall ever hold myself

Your much obliged

and very humble servant,

JOHN HARRIOT.

Mr. MORE.

Dec. 15, 1785.

*In*

*In the Third Volume of the Transactions, page 99, the Publick are informed that ARTHUR YOUNG, Esq. had communicated to the Society further Experiments on the Uses of the Howard or clustered Potatoe, and that the Account of those Experiments as given by him should make part of a future Volume: That Account is therefore now inserted, to complete his Observations on that Subject so far as they have hitherto been laid before the Society. And as the Culture of Potatoes is now acknowledged of the first Consequence, not only for the Table, but also for the feeding Hogs, Cattle and Horses, every Account shewing the comparative Excellencies of the different Species of that kind of Root, will be of acknowledged Utility to those Persons attentive to Improvements in Agriculture.*

CON-

AGRICULTURE. 61

CONTINUATION  
OF THE  
EXPERIMENTS  
ON THE  
CLUSTERED POTATOE,  
At *BRADFIELD HALL*,  
SUFFOLK.

EXPERIMENT XI.

CULTURE, EXPENCES, AND PRODUCE OF  
TWO ACRES AND A QUARTER, 1780.

UPON my return from Ireland, in  
1779, I took into my hands a small  
farm, (at Michaelmas) the only one out of  
lease;

## 62 AGRICULTURE:

lease; and determining to prosecute the culture of Potatoes, I directed a dunghill I had bought of the tenant, to be spread upon two acres and a quarter of Barley stubble: this was done the first week in March, 1780. The 10th and 11th, ploughed it in, planting at the same time the sets in every other furrow the plough made, Thirty-three bushels set the piece, but we fell rather short in seed. Harrowed it fine. The last week in April, skimmed over the surface, cutting the whole about one and a half or two inches deep. May 11th, here and there a Potatoe appeared; the twenty-third, they were all up, and then began to hand-hoe them.

In the night between the 7th and 8th of June, there came so hard a frost, that I found, to my astonishment, the whole crop turned as black as they were wont to be by sharp frosts in November or December. I had great apprehensions of their  
being

## AGRICULTURE. 63

being quite destroyed. June 15th, I thought they would survive; and to assist them, went in with the hoes a second time. Followed with a narrow shill. Gave a third hand-hoeing, August 31, &c. October 27th, began to take them up, carting the tops to the farm-yard for manure, and then ploughing and forking up as described before; but with this difference, on account of sowing the land with Wheat: The seedsmen, having the Seed-wheat ready, followed the plough, and strewed the seed upon the land turned over, not into the furrow; then the forks following covered it in raising the Potatoes. Produce, eight hundred and seventy-six bushels from the two acres and a quarter; or, three hundred and eighty-eight per acre dirty; producing clean, in the winter, three hundred and fifty per acre; in the whole, seven hundred and eighty-seven.

Early in the winter, I began to make the arrangements necessary for the trials to ascertain

## 64 AGRICULTURE.

ascertain their value used at home; but some Bury gardeners bought the whole crop of me at one shilling and six-pence a bushel, to take them away at their own expence; and as I knew by experience that, in a situation much more favourable than this, they would not yield more than half that value, I agreed with them: but one of the men failing, put an end to the agreement, which I was not sorry for, as, very unexpectedly to me, the poor people of all the neighbouring parishes came very fast for them at one shilling a bushel.

The frost of the 8th of June had destroyed all the common Potatoes in the country, so that I had no rival; a circumstance that I hoped would have its effect in bringing the cluster fort into use among the poor; an object of vast consequence to their welfare. Unfortunately they have in this country generally rejected the use of Potatoes; or when they have eaten them, bought only  
the

the white Kidney, or other expensive sorts. The cluster sort being called the Hog Potatoe, may prejudice them somewhat.

I sold six hundred and eighty bushels, for thirty-four pounds. I kept sixty bushels for feed; and forty-seven I used for hogs, &c. but not with attention enough to ascertain the value. As there is not an equal profit in this country in home applications, as near London, (pork not selling at equal prices) I shall suppose the value here to be sixpence per bushel.

## 66 AGRICULTURE.

### Expences per Acre.-

			£.	s.	d.
Manuring	-	-	3	5	0
One ploughing	-	-	0	5	0
Fifteen bushels of seed at 1s.			0	15	0
Planting and cutting	-		0	5	0
Harrowing	-	-	0	1	0
Shimming with great Shim			0	2	3
First hand-hoeing, 5s. second					
3s. third 2s.	-		0	10	0
Shimming	-	-	0	0	9
Taking up, labour*	-		2	12	0
Rent	1	0	0		
Tithe	0	4	0		
Poor rates, &c.	0	5	0		
			<u>1</u>	<u>9</u>	<u>0</u>
			9	5	0

### Produce per Acre.

Whole crop, 38 <i>l.</i> 3 <i>s.</i> 6 <i>d.</i> Pro-					
portion per acre	-		16	19	4
Deduct expences	-	-	9	5	0
Clear profit	-	-	<u>6</u>	<u>14</u>	<u>4</u>
					The

\* The use of the horses in ploughing is charged to the wheat crop; and they at the same time carted home the potatoes, having to wait for the men.

The soil of the potatoe part of this field, (by name, Twelve Acres) is a dry found turnep loam on a good gravel bottom; if any thing, too wet for feeding off in a wet season, but on which the turnep culture is profitable. This was the land I wished for to try Potatoes on, expecting great products—yet I was disappointed; for on a soil in Hertfordshire, three acres of which where not worth one of these, I have had greater crops: several circumstances might occasion this difference. First, The frost of the 8th of June, the severest ever known at that season, for it turned all the walnut-leaves black, and even the *plantago lanceolata* of the meadows, might occasion a considerable diminution of the crop: it certainly retarded the growth near six weeks. Secondly, The dung was purchased, not made on my own farm, which I have found to create a great difference: the farmers let their cows and other cattle wander at plea-

68      AGRICULTURE.

sure about their fields, returning at will to the straw yard : the consequence of this is, their dunghill being nothing more than a heap of rotten straw or stubble, with little or no animal manure in it. On the contrary, my practice has always been to confine all cattle whatever closely to the yard throughout the winter, which makes the dung of double the value. Thirdly, Notwithstanding the natural goodness of the soil, it had been much harraffed by the repeated cropping of the preceding tenant, whose lease of fourteen years was just expired. These three reasons may be thought perhaps to explain why the crop was not larger.

But it was considerable enough to yield such a profit as no common crop ever affords, and proves very clearly how exceedingly advantageous the culture is.

I have before mentioned that the land was sown with Wheat at the time of taking up the Potatoes. That crop gave me an idea for the first time in my life that Potatoes were rather of an exhausting tendency: I had always steadily conceived them to be very much the contrary.

The workmen, all, while they were taking up this crop, said I should have no Wheat; it would be too rank and laid: but the contrary was the fact; there was no luxuriance in the colour through the latter part of the spring, nor at harvest, which spoke its being very well fed; part adjoining, after other preparations without dung, was equal. It is true the poverty of the dung, and the tenant's cropping, would affect this product; so that I venture no more than to offer a suspicion that this Potatoe, contrary to a thousand assertions in print, exhausts very much.

## 70 AGRICULTURE.

I was not equally able to make this observation upon the poor soil I occupied in Hertfordshire, for I never ventured Wheat after them; and though I got very good Barley after, yet the manurings were so ample that I could not decide the question, had it been put to me.

### EXPERIMENT XII.

CULTURE, EXPENCES, AND PRODUCE OF FIVE ACRES, 1781. Four acres of this crop (in field called Jermyn) were on a wheat stubble very much exhausted by the tenant, but the soil an exceeding good sandy loam, dry enough for Turneps, yet excellent wheat land. The other acre was part of an old upland meadow (by name, Horse Close,) which I ploughed up, designing it for a new garden; and as a variation of  
of

## AGRICULTURE. 71

of culture, I planted it with Potatoes in the manner of the other crops, every furrow, but without any dung.

Between March the 4th, and the 31st, I carted three hundred and sixty one-horse cart loads (not three-wheeled, but containing about twenty bushels) of compost farm-yard dung\* and earth, on to the four acres; which being spread, we began to plant, April the 7th, finishing the 11th; one land being set with the Red Kidney, and the Irish White-eye.

The piece of meadow land was planted the 16th of March. The 9th and 10th of May, very sharp morning frosts damaged many of those that were up; but not to the degree that happened last year. It was the first week in May, before I went over the field with the shim; and June the 1st, I horse-hoed them with the narrow shim.

E 4                      Between

\* Made in the Winter of 1779, 80.

Between the 11th and the 23d of June, hand-hoed them very carefully, raising the spear grass (*triticum repens*) with four-pronged forks, where it was found in bunches, and carrying it off the land. The twenty-fifth, ran a double mould-board plough through the rows. July the 7th, &c. hand-hoed them again, and afterwards hand-weeded. The acre of grass being set every furrow, had no horse-hoeing; and so few weeds came up, that one hand-hoeing kept it clean. October the 3d, began to take up, carting the stalks to farm-yard; finished the 24th.

In this operation, which hitherto had been the most expensive article of the culture, costing me last year no less than £. 2. 12s. per acre, and always being a very heavy charge, I made an improvement which, as it answered exceedingly well, should not be omitted. In the way  
hitherto

hitherto practised of taking them up, the plough having turned a furrow, the men break it in pieces with forks, for boys, &c. to pick the Potatoes ; this being the expensive part, was what I tried to save. I constructed an iron ploughing harrow to fix in the holes of my shim beam, with two, three, or four teeth (to be used according to the tenacity or friability of the land) standing obliquely, so that the horse walking in the path of the furrow, the teeth might be in the direction of the land turned over by the plough. But, upon trial, the labour to keep it in that direction was too great ; to remedy which, I added a semicircular iron to slide against the land side of the furrow at the bottom of it ; and by trying it repeatedly with the smith in the field, and going from the furrow into the forge, and from the forge to the furrow, did not leave it until it worked to my mind.

This

## 74 AGRICULTURE.

This harrow, with one man, one horse, and no boy to lead, tears the furrow to pieces, and scatters it so as to lay bare all the Potatoes. It did the work of ten to fifteen men; and if there was any material difference, it was in its favour: not that forks very carefully worked, could not do it better; but when so many people are collected, no attention of the master will prevent talking, carelessness and idleness, occasioning neglect. The great proof is, the succeeding crop of Wheat not having more Potatoes among it than were in that which succeeded the forks of the last year.

In a word, I had every reason to be satisfied with the tool. First the plough went, then the boys picked all the Potatoes that appeared; the harrow followed, and the boys picked again.

Produce in the whole, one thousand eight hundred and eighty-eight bushels  
out

## A G R I C U L T U R E.      75

out of the field ; clean in the winter, one thousand six hundred and twenty-seven.

Clean.

The four acres of wheat stub-	
ble produced of the cluster	1357
Of the other sorts	70
	<hr/>
	1427
	<hr/>
Per acre	356
	<hr/>

The one acre of lay produced but two hundred bushels. This was entirely owing to the turf in ploughing being laid too heavy on the seed ; it could not get through but with difficulty : had they been dibbled in with an iron dibble, I believe the crop would have been much more considerable, as the soil is a loam on a marly clay, stiffer and wetter than those I have already described. A few rows of common Potatoes, did not get through at all ; which shews that

## 76 AGRICULTURE.

that the cluster has a much stronger and more powerful vegetation. I shall calculate only the crop of the four acres.

Expences per acre.

	£.	s.	d.
Manuring, ninety loads of compost *	2	13	9
	<hr/>		
Carried over	2	13	9
	<hr/>		
	One		

\* The only way I have of calculating what was the actual expence of this manure, is to reckon the price of the stubble and straw bought—the cartage and the labour:—To estimate it at what I could have sold it for, would be vague, and lead to no useful conclusions.

	£.	s.	d.
Eleven acres of stubble bought of the tenant that left the farm, at (according to his lease) 1s. 6d. per acre	0	16	6
Chopping and gathering ditto at 1s. 9d.	0	19	3
Paid for carting it to the yard	1	10	0
	<hr/>		
Per acre 6s.	3	5	9
	<hr/>		
Carried over	3	5	9
	Four		

# AGRICULTURE. 77

	£. s. d.
Brought over	2 13 9
One ploughing	0 5 0
Twelve bushels of feed	0 12 0
Cutting at 2d.	0 2 0
Planting	0 3 6
Shimming surface	0 2 6
First hand-hoeing	0 6 0
Horse-hoeing	0 6 0
	<hr/>
Carried over	4 6 3

Double

	£. s. d.
Brought over	3 5 9
Four loads of straw	3 4 0
Turning and mixing	0 12 0
Filling and spreading three hundred and sixty loads, and driving the carts away twenty days, at 1s. 8d.	1 13 4
Two horses, twenty days, at 2s.	2 0 0
	<hr/>
	10 15 1
	<hr/>
Per acre	2 13 9

The earth made the greater part of the compost.

# 78      AGRICULTURE.

	£.	s.	d.
Brought over	4	6	3
Double mould-board ploughing	0	1	2
Second hand-hoeing	0	1	8
Hand-weeding	0	1	3
Labour, taking up, ploughing, harrowing, picking, carting, and laying-up	0	18	9
Carting home, &c. at 1s.	0	2	6
Expences, horses, and labour for carrying such of the crop as was sold at a distance; hor- ses, 2l. 7s. labour, 2l. 6d. in all, 4l. 7s. 6d. Proportion per acre	0	17	6
Rent, tithe, and rates	1	15	0
	<hr/>		
	8	4	1
	<hr/>		

Produce,

# AGRICULTURE. 79

## Produce.

Bush.	£. s. d.	each.
1304 clufter sold for	46 14 1	or 8d.
93 do. ufed for Hogs	1 11 0	or 4d.
60 do. ufed for Sheep	0 0 0	
100 do. faved for feed	5 0 0	or 1s.
70 common fort, fold or faved for feed	7 0 0	or 2s.
<hr/> 1627 <hr/>	<hr/> 60 5 1 <hr/>	

Or, on an average,  $8d.\frac{3}{4}$  each;  
at which price three hun-  
dred and fifty-fix, the acre-  
able produce, come to

	12 19 7
Expences	8 4 1
	<hr/>
Clear profit	£. 4 15 6

O B S E R -

## 80 AGRICULTURE.

### OBSERVATIONS.

IN relation to the value here charged in the application to sheep and hogs, I must inform you that the hogs were fattening ones;—the Potatoes were boiled and given alone;—and by weighing alive in the manner described in the preceding experiments, that value was ascertained: but it is fair to observe that, of all the hogs I ever fattened, none throve so ill; not owing to the food, for they did as badly when afterwards put to the Barley-meal. I am now got to the country where this event will arise until I am fixed in a good breed of swine, for there are many hereabouts very bad. As to the sheep, I must beg to be a little more particular.

I had been informed in Ireland, that Wethers had been fattened there to a  
great

## AGRICULTURE. 81

great weight by Potatoes; and having in the winter, preceding this experiment, fattened a parcel of them very successfully on carrots, I determined to try them this winter with Potatoes. November the 21st, I weighed sixteen wethers alive; the weight was one thousand four hundred and thirty-two pounds: inclosed them as I had done those fed on carrots, in a pen on dry grafs, which was moved occasionally. January the 14th, I weighed them again, as they visibly fell away: their weight was only one thousand two hundred and sixty-four pounds. They had lost therefore, instead of gaining, one hundred and sixty-eight pounds, having eaten sixty bushels of Potatoes. I immediately put an end to an experiment so manifestly mischievous, by putting the sheep to Turneps.

This was the cluster Potatoe: what they might have done on other sorts, I do not know, and shall not try.

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## 82 AGRICULTURE.

Having last year suspected the exhausting quality of this Potatoe, I observed very attentively the result in the Wheat that followed this crop. The four acres are part of eight: one was under Turneps fed off forward by sheep, and three in Pease; the whole field sown with Mr. ARBUTHNOT'S red velvet Wheat. Some friends who saw the manuring for the Potatoes, said that, if there was not an immense crop of Wheat in that part, it would never be gained. The contrary, however, was the case; the product in grain was much diminished by the mildew; but that had no effect on the appearance of the luxuriant vigour of a crop while in the blade. The corn shewed no signs of any uncommon luxuriance; it was better than after the Turneps, and but little: the Pease failed, and consequently the Wheat after them was not great.

## AGRICULTURE. 83

I am not yet decided in my opinion upon this question; but I still suspect this Potatoe to exhaust considerably. The friends of the culture should not, however, be alarmed at this; for though it is a deduction from its value, still that value in its product is so very considerable as to leave it, notwithstanding this circumstance, one of the most beneficial plants the farmer can put in his ground. The clear profit this year, (4*l.* 15*s.* 6*d.*) after paying manure and all charges, is more than the gross product of three fourths of the Wheat in this country, no charges at all paid, which is such a difference as to allow no parallel between them.

### EXPERIMENT XIII.

CULTURE, EXPENCES, AND PRODUCE OF ONE ACRE, 1782. The register of this experiment affords two useful con-

F 2                      clusions,

## 84      A G R I C U L T U R E .

clusions, and for that reason I shall give it; but as it may be said to have failed entirely, I shall make it very short. I was so convinced of the profit of the cultivation, that I determined to enter more largely on it; accordingly I prepared a compost of above nine hundred loads, in order to plant no less than eleven acres. The field (by name, Hither Ardera) is of a loose wet sandy loam on a clay marle, but laid dry by arched ridges. The death of a relation hurried me suddenly to London, at a most critical season, just as I was going to cart the manure for planting. I was obliged to trust the work to a common labourer in whom I had little confidence. He did it to his time, ploughed and planted the whole field; but the season being so incessantly rainy, he poached it to such a degree, that, on my return, I saw at once that all my hopes were blasted.

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## AGRICULTURE. 85

There was a single acre, over which no manure was spread (the compost covering but ten acres), that I determined to preserve, as no carting had been done on it; the rest I ploughed up for a fallow. That single acre on a poor wet soil without dung, and plaistered by wet ploughing, I kept clean in the way already described, and took it up with my new harrow invented last year, and which performed as well as before.——This acre, thus ill circumstanced in almost every respect, produced, to my wonder, one hundred and eighty bushels, which were sold, except what I reserved for seed, at one shilling a bushel, at the barn-door, or nine pounds. The expences, including all charges whatever, four pounds two shillings and sixpence: Clear profit, four pounds seventeen shillings and sixpence. It is now sown with Wheat; and having had no manure, I expect

## 86     A G R I C U L T U R E .

that crop will fail—but that, time will decide.

The two facts arising from this experiment are,

First, That this poor loam will yield a crop of this Potatoe, without manure ; of any other sort, I am clear it would produce none.

Second, That the manure for Potatoes ought to be carted and spread upon all soils inclinable to wet, before the planting season, either in the autumn preceding, or else during a hard frost. I took this hint myself, and have now my land for next crop dunged and ploughed in last November.

E X P E -

## AGRICULTURE. 87

### EXPERIMENT XIV.

CULTURE, EXPENCES, AND PRODUCE  
OF THREE ACRES AND A HALF, 1783.  
The soil a good turnep land loam, on a  
sound gravelly bottom. Manured it from  
the farm-yard, in November, at the rate  
of fifty-one horse loads an acre, each  
about twenty bushels, spread and ploughed  
in. Thus I tried a new method of  
culture. I had always hitherto manured  
in the spring, and ploughed in the dung  
under a whole furrow. I thought that  
a second earth at sowing, would not only  
pulverize, but mix the manure better  
with the soil, and at the same time give  
the opportunity of planting as early as  
circumstances would admit. March 31st,  
harrowed it: April the 1st, rolled and  
harrowed again. The 9th, 10th, and  
11th, ploughed and planted it with the

## 88      A G R I C U L T U R E .

clustered Potatoe, except as much as three bushels of a new Potatoe (the white cluster) would set: the 28th, harrowed the whole.

I should observe that the season had been remarkably dry; even in the winter we had very little rain. May came in with cold winds and sharp morning frosts: the 26th, there was so severe a one, that it destroyed the potatoe leaves that were up, and even killed those of many oaks and ashes. The 27th, there fell twelve hours of rain. Nothing could be more unfortunate than the effect of the frosts, for they prevented hoeing the crop until much too late. The young plants that were just peeping out of the ground, were rendered invisible: waiting for their rising again, gave time for the weeds to get a head, and made the cleaning this crop more expensive than any I ever had before. It was the 7th of June, before

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## AGRICULTURE. 89

I could begin. Shimmied the rows twice July 5th, and earthed them with double mould-board plough. The nineteenth, began to hand-hoe again; which was repeated: the next day earthed up again. The 9th of October, the tops were killed by frost: the 20th, began to take up in the same manner as described in the two last experiments; the harrow answering as well as ever. Half ploughed it again across on to two furrow ridges, picking after the plough for the few Potatoes that escaped the former tillage. I did this, that the land might be the more exposed in winter, and lie drier, as I intended Barley and Lucerne to succeed.

Product in all, eight hundred bushels, of which forty-eight were of the white cluster. Acreable product, two hundred and twenty-four.

Expences

# 90      AGRICULTURE.

## Expences per Acre.

	<i>£.</i>	<i>s.</i>	<i>d.</i>
Manuring	2	0	0
Ploughing twice	0	10	0
Harrowing and rolling	0	1	3
Planting	0	4	3
Fourteen bushels of feed	0	14	0
Cutting ditto	0	1	8
First hand-hoeing	0	12	0
Second ditto	0	6	0
Third ditto	0	10	0
Four horse-hoeings	0	5	0
Taking up, labour, 18s. use of horses in ditto, and carting home, 4s.	1	2	0
Ridging up	0	2	6
Rent, tithe and rates	1	8	0
	<hr/>		
	7	16	8
	<hr/>		

Produce.

# AGRICULTURE. 91

Produce.

	<i>£. s. d.</i>
Two hundred and twenty-four bushels at 9d.	8 8 0
Expences	7 16 8
	<hr/>
Profit	0 11 4
	<hr/>

## OBSERVATIONS.

THE value of nine pence per bushel, here carried to account, was deduced from feeding horses with the root, both boiled and raw. I found from several trials, that sixteen bushels of them boiled would last five horses six days, which is rather better than two pecks each, per diem; but given raw, they did not eat so much. The value of any root thus applied, must be ascertained by the saving of  
of

ing of Oats—which is only to be guessed at. I do not offer this value of ninepence, as a perfectly accurate conclusion; but I am inclinable to think it near the matter. The experiment lasted above a month; but it was not long enough, nor under circumstances sufficiently various, to permit me to declare that they may be depended on as a food for hard-worked horses. This must be tried further.

I should observe that the horses dunged firmer, while fed with them boiled, than when given raw.—The expence in labour and fuel in washing and boiling, is threepence a bushel; that is, one penny labour, and near two-pence fuel.

The White cluster, appears to yield nearly as well as the Red; but they are little better flavoured.

In the severe frost that happened this winter, I lost more Potatoes than ever I did before,

before, which made me resolve in future to contrive some method of stowing them under ground.

The profits of this year's crop, even if I had reckoned what I sold at one shilling a bushel, was little or nothing. Two circumstances contributed: First, the season in general, which was a dry and burning summer, little suitable to a plant that never thrives so well as in wet years. Second, the spring frost, by interrupting the hoeing, not only raised the expences very high, but greatly injured the crop by letting the weeds abound more than they would have done without that cause. These untoward circumstances prevented my reaping any experience from the variation I had made in preparing for them; and thus it is too often in experiments in agriculture. A year is necessary to know the effect of any mode or variation of culture: a thousand accidents or peculiarities of  
of

## 94      A G R I C U L T U R E .

of season, render many repetitions essential to the acquisition of knowledge, which thus slowly and difficultly attained ought to be held in much higher estimation than the world in general is willing to grant.

In relation to the effect of the plant on the succeeding crop, I have to observe that I cannot continue the conclusions against them which I began before ; but I did not sow Wheat ; the crop was Barley. The field is six acres ; three and a half Potatoes ; above two, Beans ; and one land, summer fallowed : the whole equally dunged, and all sown with Barley, which was so equal in every part of the field, being all a very fine crop, that it was impossible to say which was best. This seems to mark Potatoes as a better preparation for spring Corn, than for Wheat.

E X P E -

EXPERIMENT XV.

CULTURE, EXPENCES, AND PRODUCE  
OF TWELVE ACRES AND A HALF, 1784.  
The soil a cold but friable loam, upon a  
clay marle bottom, which makes the field  
wet for want of draining; yielded Oats  
in 1783. November 1st, began to dung  
it from the farm-yard, part of the com-  
post of the preceding winter\*. Spread  
two hundred and ninety-eight loads over  
eight acres of it; the rest not manured  
at all: ploughed the whole immediately,  
finish-

\* As this is not a common yard system, a word or two  
is necessary to explain it. The yard is first spread with  
marle, and then littered; the cattle were confined the  
whole winter on it: then it is once stirred over, and the  
winter tare crop all consumed on it in soiling. Horses,  
cattle and hogs, make much urine while fed with green  
tares: the compost receives the whole, which, with the  
offal of the food, adds greatly to the richness of the heap.  
When foddering continues late in the spring, and winter  
tares

## 96 AGRICULTURE.

finishing December the 12th. The first of May, ploughed it clean; harrowed after the ploughs; and to try a new method of planting, in which the mould would fall in the lightest manner possible on the seed, I struck the land with the common plough into furrows two feet asunder; and dropping the Potatoc sets in these, at twelve inches apart, covered them by running a pair of harrows up and down the furrows, then rolled and harrowed again. Nothing could work finer, dryer, or in a manner more promising for a crop. Planted in this manner one acre and a half with the white cluster;

tares are forward, there is not time to stir over, in which case that operation is deferred until foiling is over: but if Lucerne is used, it lasts so long that the turning over must not be delayed. Leaving it afterwards untouched until Michaelmas (that is, until the exhaling power of the sun no longer unites with any strong fermentation) is essential; then it is in fine order for carting immediately to the land on to meadow or young clover, or grass seeds, or potatoes, beans, or other spring crops.

cluster; two acres with the champion, a very fine table Potatoc that never curls, and the rest of the field with the red cluster.

June the second, &c. cut the surface with the great shim. It was the sixteenth, before the rows were up plain enough to horse-hoe. Shimmed them; the nineteenth, harrowed them across, not damaging them by so doing. The 24th, hand - hoed the first time. July 21st, hand - hoed again, and shimmed a second time. The season had been for some time exceedingly wet, so that the weeds grew apace. Hand-hoed again in August, and earthed up with double mould-board. October 18th, began to take up, and finished November the second. Pursued the same method as before, and had every reason to be satisfied with the ploughing harrow. I found that thirty-five pickers, women, boys and girls, with two or  
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## 98 AGRICULTURE.

three men to keep them in order, would keep two ploughs at work, and find full employment for one horse to draw home the Potatoes.

The crop is now in consumption; I can therefore only guess at the amount. I calculate it between three thousand and three thousand five hundred bushels.

Having suffered last year by the frost, I had prepared for this crop holes in the earth. I dug one square, and two oblong, five, six, and seven feet deep; and a drain across the bottom, from five to nine inches below it; which was filled in the manner of a hollow drain, and by sinking a ditch very deep, made it impossible for any water to remain. Raised over the square hole, a very strong roof; hurdled it; and laying a bed of stubble, covered it up eighteen inches thick with earth, except the door, which being hung  
in

in an angle of about forty degrees, and furrounded with plank, could be covered eighteen inches deep with sand, very expeditiously; and thus I conceive the Potatoes will be secure from the most intense frost known in this climate. One of the other holes I fitted with a door in the same manner at one end; and then, to save expence, laid trees across, with hurdles, stubble and earth: the other I covered only with stubble and earth, designing to put its contents at once into the square one when empty. The Potatoes which these holes would not contain, I packed in houses.

The White Cluster did not produce nearly equal to the Red.

The dunged part of the field yielded double the crop of Red Cluster, to that not dunged.

100      AGRICULTURE,

I shall suppose the value of eight pence a bushel, as I have yet had no time to ascertain it; but intend to try them accurately on horses, hogs, and bullocks.

Expences per Acre, Red Cluster, dunged,

	£.	s.	d.
Manure	2	0	0
Two ploughings and an half	0	11	0
Harrowing and rolling	0	1	6
Planting	0	2	0
Twelve bushels of seed	0	12	0
Cutting	0	1	6
Shimming surface	0	2	6
Three hand-hoeings	0	11	0
Three horse-hoeings	0	3	4
Taking up, including two ploughings, labour only, 17s. horses in ditto and carting, 7s. 6d.	1	4	6
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Carried over	5	9	4
		Rent	

# AGRICULTURE. 101

	£.	s.	d.
Brought over	5	9	4
Rent, tithe, and rates	0	17	0
	<hr/>		
	6	6	4

	£.	s.	d.
Produce.			
* Two hundred and fifty bushels at 8d.	8	6	8
Expences	6	6	4
	<hr/>		
Profit	£.	2	0 4
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## OBSERVATIONS.

I committed one error in this crop,  
which was very great, cutting the fets  
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\* I am stating the produce low enough to avoid the hazard of exaggeration ; for I have reason to think the crop will turn out more than this.

in a hurrying season when every hand was employed. I trusted an old fellow and two women with it, whose fight was either bad, or their carelessness great; for the plants came up very irregularly, with many gaps; so that I am persuaded I suffered in the whole field, to the amount of from five to eight hundred bushels, and perhaps more.

The product was very small, yet the plants throve throughout the season perfectly to my satisfaction; and at taking up, the Potatoes, even where there was no dung, were large and very well grown; a sure proof, with such a produce, that the land was under-fed.

Here, Gentlemen, conclude my experiments on this Plant. From the first Potatoe that was put into my hands in the year 1770, to this day, I have never lost sight of the culture; but whenever I was not prevented

prevented by journies to another kingdom, cultivated it assiduouſly. My ſituation in life does not permit me to embark very greatly in any object that will not promiſe ſome reimbursement for expences. There are points yet undecided, particularly the value of it in divers applications, which I long much to aſcertain, but the expence is beyond my forces. I ſhall do it, but it will be by ſlow and gradual ſteps: a winter will rarely permit me more than one or two good experiments in that enquiry. I purpoſe trying them further on horſes and hogs; alſo in fattening bullocks: but I have had ill ſucceſs with fat ſheep\*; I ſhall therefore do the reſt cautiously.

A general obſervation reſults from all theſe experiments, which is highly ſatis-

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factory

\* They had had the ſummer's graſs, and were ready (half fat) for Turneps: in that ſituation, experienced graziers know the conſequence of a conſiderable check. It would be the ſame, ſhould they fail with bullocks.

factory—that with small crops, and at the low rate of value which is produced by consuming the Potatoes at home, they are clearly proved to be a crop which will pay the expence of manuring, and very ample tillage and hoeing. This is, after all, the chief object of modern husbandry—for if a man can rely upon this Potatoe, for the winter consumption of his yard, in fattening or keeping hogs, in feeding his horses, and fattening his bullocks, he has made one of the greatest acquisitions that can be desired, since he can do all this upon land much too stiff and wet for Turneps; houses his crops before the winter rains come on, and consequently without doing any of that injury to his land which the turnep culture is known to intail, and from which even cabbages are not free; effecting this by means of a root which is probably, of all others, liable to the fewest failures. Those who know the importance  
of

of winter food on a turnep farm, cannot but admit the magnitude of this object on wet soils.

But upon the dryest, it is not without a great value.—Turneps dunged for are universally a losing crop; for if they are stated at from thirty to forty shillings an acre, their value does not amount to the dung alone which is spread for Potatoes: yet the latter root pays that dung, all other expences, and leaves a profit sometimes considerable. I admit that Turneps fed upon the land will prepare better for corn; but that is by no means the question. Would not the dung raised in the farm-yard by the consumption of the Potatoes, supposing it spread upon the potatoe acre, make that produce more than the turnep one? I have no doubt but it would give a superiority.

But

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But Turneps are liable to great failures, and cannot be relied on late in the spring —Potatoes may; and are applicable to uses to which the other root cannot be applied.

Upon the whole, Gentlemen, I am clearly of opinion, that you never made a more valuable present to the world, than by recommending this Potatoe, which is one of the most important articles that can at present be cultivated upon any farm.

I am

Your obliged and devoted servant,

ARTHUR YOUNG.

To the Society for Encouragement of Arts, &c.

*Bradfield Hall,*

Nov. 9, 1784.